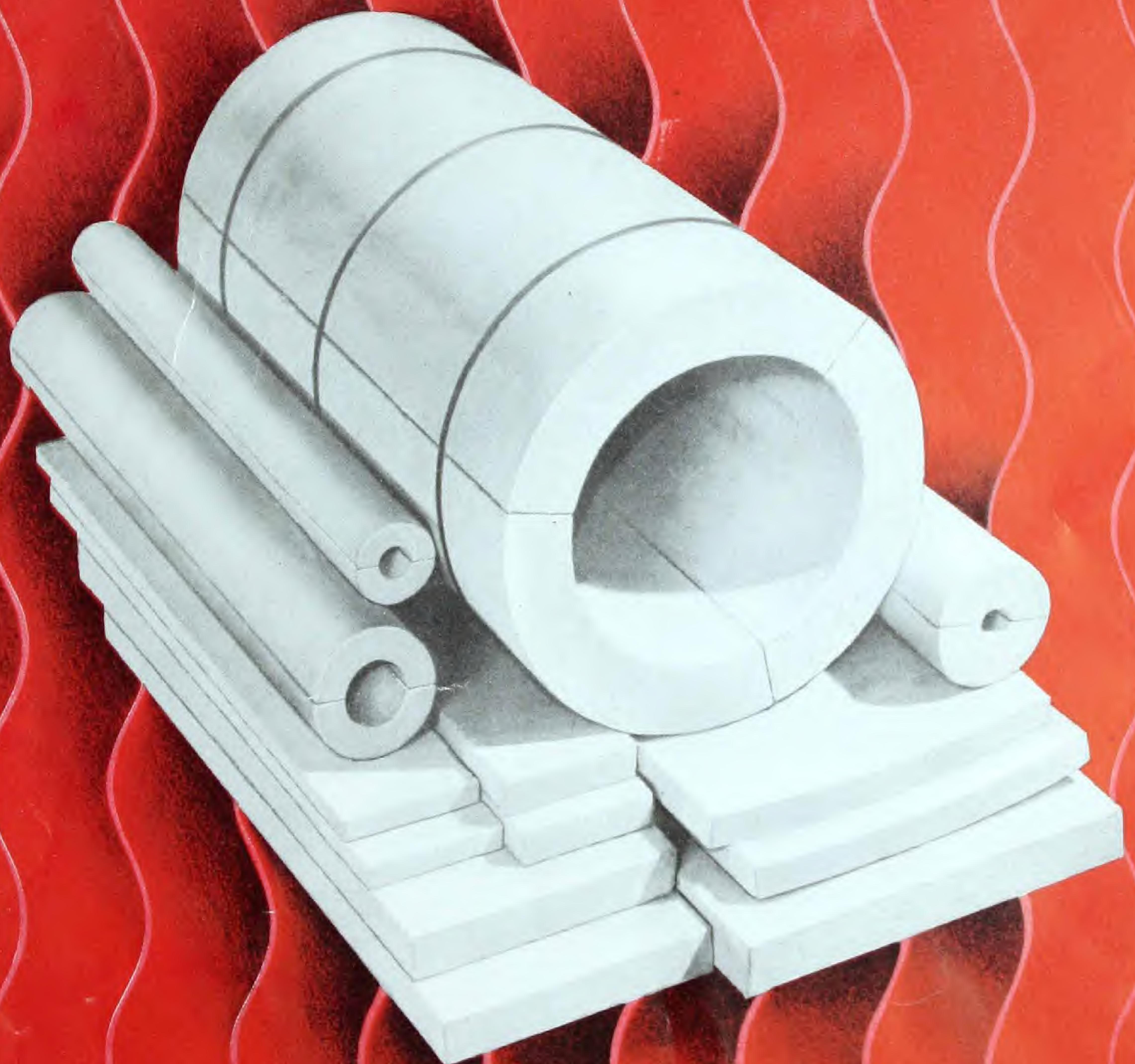


691.9

for temperatures up to 1200° F.



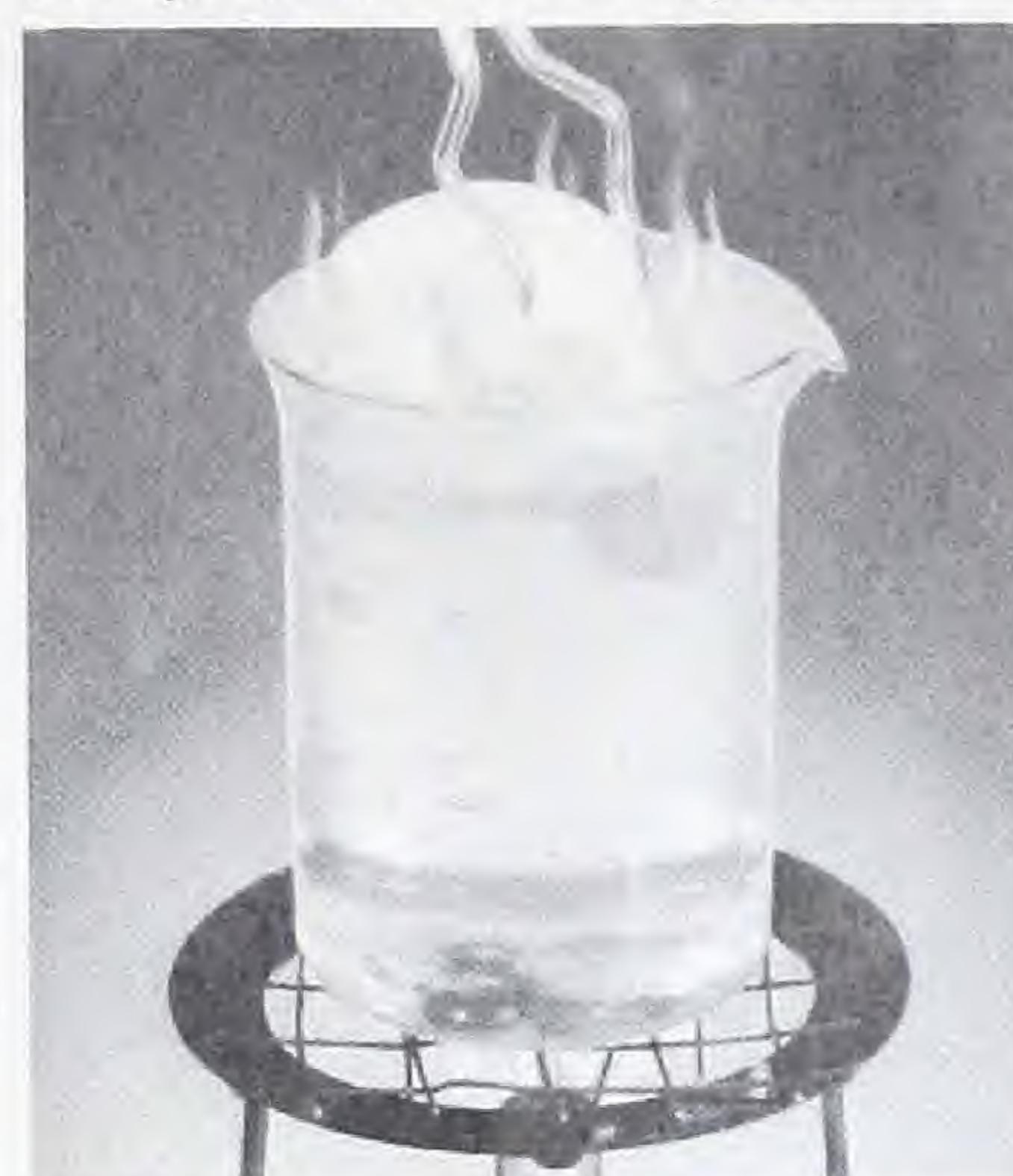
OWENS  ILLINOIS
GLASS COMPANY, Toledo 1, Ohio

...first in calcium silicate

KAYLO
HEAT INSULATION



Kaylo Heat Insulation is easily cut with ordinary tools.



Boiling water does not break it down.



Light weight combined with high strength.

KAYLO

HEAT INSULATION

HYDROUS CALCIUM SILICATE

Kaylo Heat Insulation is made of a chemical compound of lime and silica developed by Owens-Illinois Glass Company. Although not glass, it is made of materials similar to those used in glass, and with which Owens-Illinois has had long experience. The technical name is hydrous calcium silicate. Since it is a chemically reacted material, it contains no added binder. For mechanical effects, a small amount of asbestos fiber is included at the time of manufacture.

Few materials have been so thoroughly tested. Owens-Illinois began work on hydrous calcium silicates in 1938, but no material was offered to the general market until 1943. Thousands of installations since that time have proved field superiority, yet research and product development are still continuing.

Kaylo Heat Insulation is made both as block and as molded pipe insulation, with the widest range of sizes, forms and thicknesses of any high temperature insulation available. Kaylo hydrous calcium silicate combines the most desirable physical characteristics of heat insulating materials to a degree not equalled by other materials on the market. This means outstanding performance and economical application for the user.

PERFORMANCE

Kaylo Heat Insulation is effective up to 1200°F., performing efficiently on temperatures through the hot water and low pressure steam range and also through temperatures in the super-heated steam range. Therefore, a single material can

be used for high temperatures which usually require combinations of two different insulating materials.

The *low coefficient of conductivity*, or "k", of Kaylo Heat Insulation places it among the most efficient insulations for temperatures up to 1200°F. (The name "Kaylo" is derived from the fact that "k" is low for the material.) Its high insulation value comes from the extremely small pore structure. So small and numerous are its insulating air spaces that they present a material internal surface of approximately 100 acres per cubic foot of insulation.

Water does not break down Kaylo Heat Insulation. Even when saturated, it retains about 85% of its strength. After being soaked for long periods of time and then dried, it returns to its original thermal efficiency and strength, without apparent shrinking or warping.

Kaylo Heat Insulation is effective after long service. It remains strong and efficient over the years and shows little shrinkage after exposure to temperatures up to 1200°F.

APPLICATION

With a weight of only 11 pounds per cubic foot, handling, shipping and application are simplified.

Kaylo Heat Insulation has flexural strength, compressive strength and resistance to abrasion far above normal requirements for heat insulation. Breakage during installation, therefore, is usually negligible.

Block or pipe insulation can be cut, scored or sawed with ordinary tools of the trade. The material is non-irritating to the skin and non-toxic.

PHYSICAL CHARACTERISTICS

DENSITY.....Approximately 11 lb. per cu. ft.

FLEXURAL STRENGTH.....50 lb. per sq. in.

COMPRESSIVE STRENGTH (at 5% deformation)

Before heating.....150 lb. per sq. in.

After heating for 24 hours

at 750° F.....144 lb. per sq. in.

at 1000° F.....123 lb. per sq. in.

at 1200° F.....117 lb. per sq. in.

After boiling for 24 hours

(while wet).....74 lb. per sq. in.

LOSS IN WEIGHT

After heating for 24 hours

at 750° F.....5.5%

at 1000° F.....7.9%

at 1200° F.....9.8%

After boiling for 24 hours (after drying).....0.2%

RESISTANCE TO ABRASION

(Conventional tumbling test-loss in weight
after 10 minutes)

Before heating.....2.2%

After heating for 24 hours

at 750° F.....3.7%

at 1000° F.....5.7%

at 1200° F.....6.9%

DIMENSIONAL STABILITY

Linear shrinkage after heating for 24 hours

at 750° F.....0.8%

at 1000° F.....0.9%

at 1200° F.....1.5%

Elongation after saturation (max.).....0.04%

MOISTURE ABSORPTION (volume)

After 6 hours exposure in atmosphere of
120° F. and 90% Relative Humidity.....0.9%

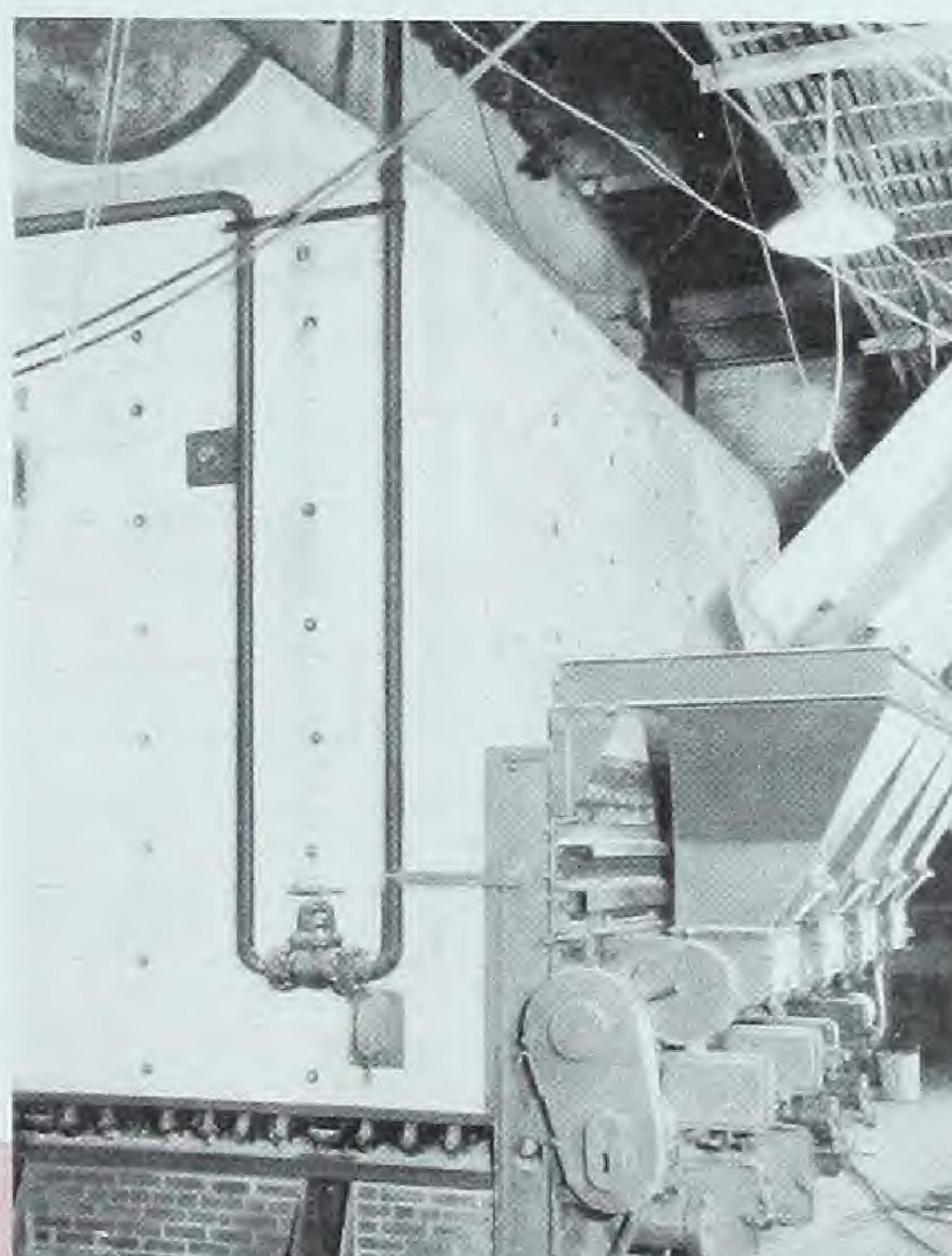
CONDUCTIVITY (K)

At 100° F. mean temperature.....0.41

At 500° F. mean temperature.....0.54



*Applicators like its light weight
and good "handleability".*



*Neat, clean jobs result when Kaylo Heat
Insulation Block is secured with studs.*

TYPICAL APPLICATIONS

Inside or outside, for temperatures up to 1200° F., Kaylo Heat Insulation is used for such equipment as:

Autoclaves

Kilns

Boilers

Lehrs

Breechings

Locomotives

Chilling Pits

Ovens

Condensers

Precipitators

Dryers

Process Equipment

Evaporators

Steam Lines

Furnaces

Tanks

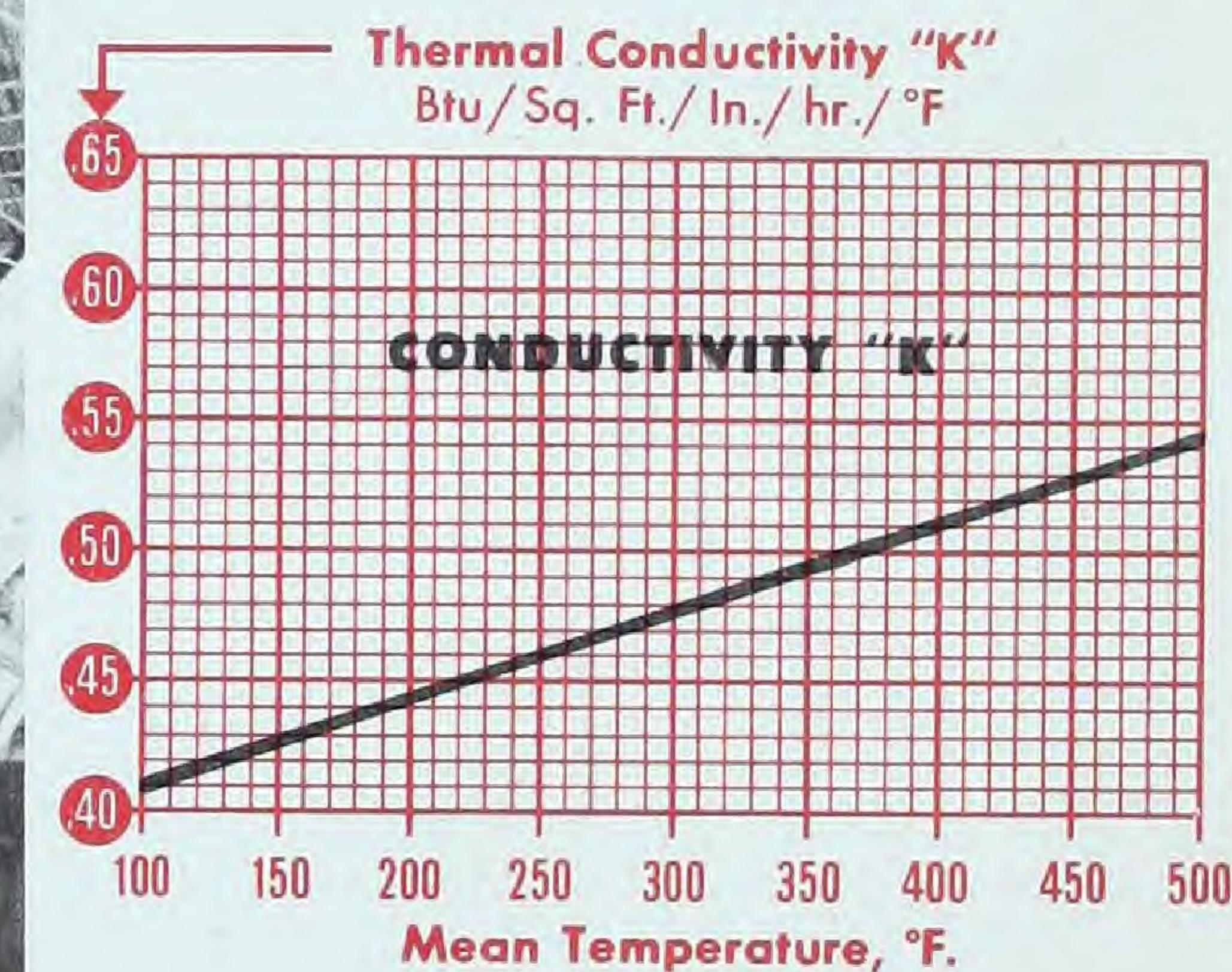
Heat Exchangers

Towers

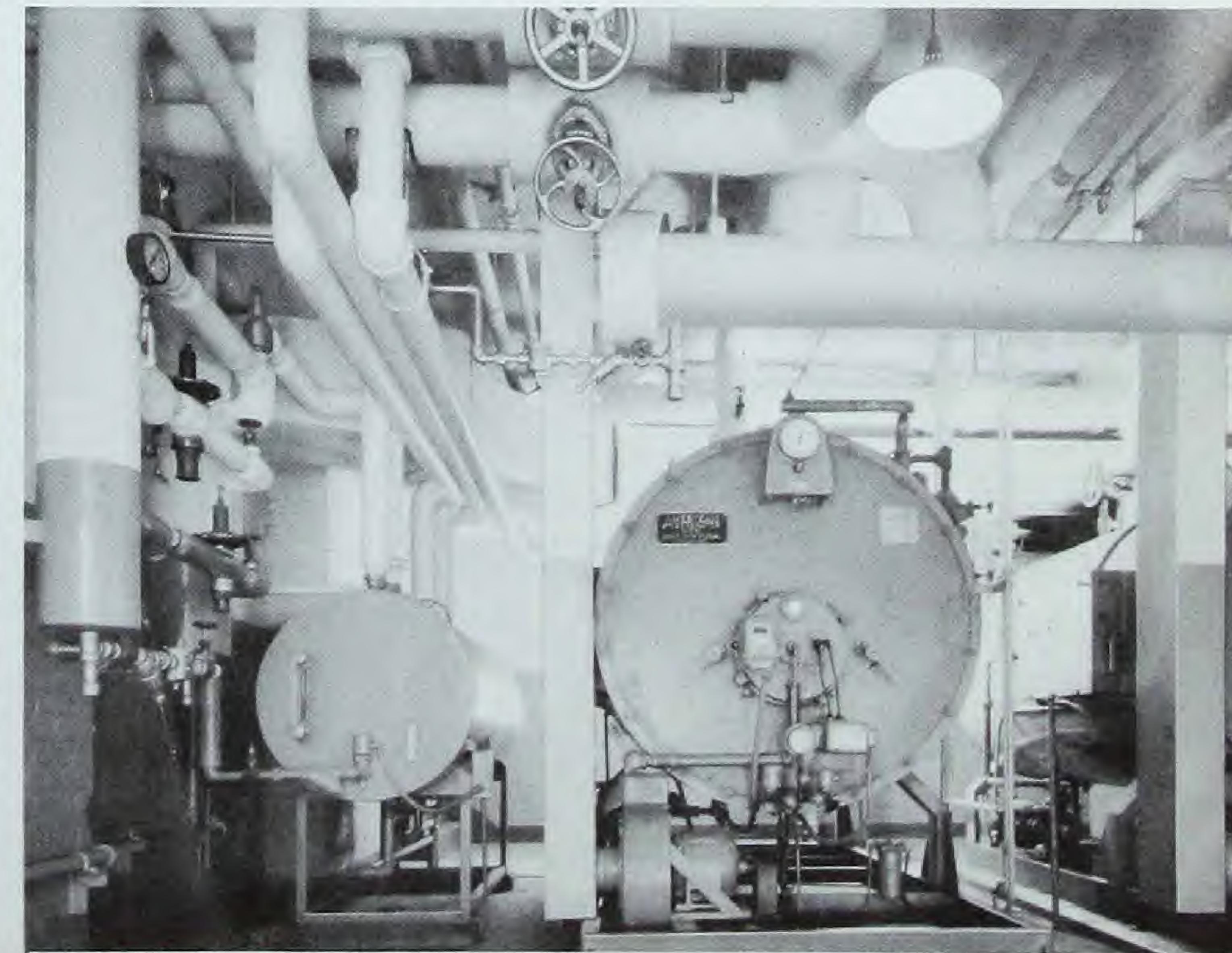
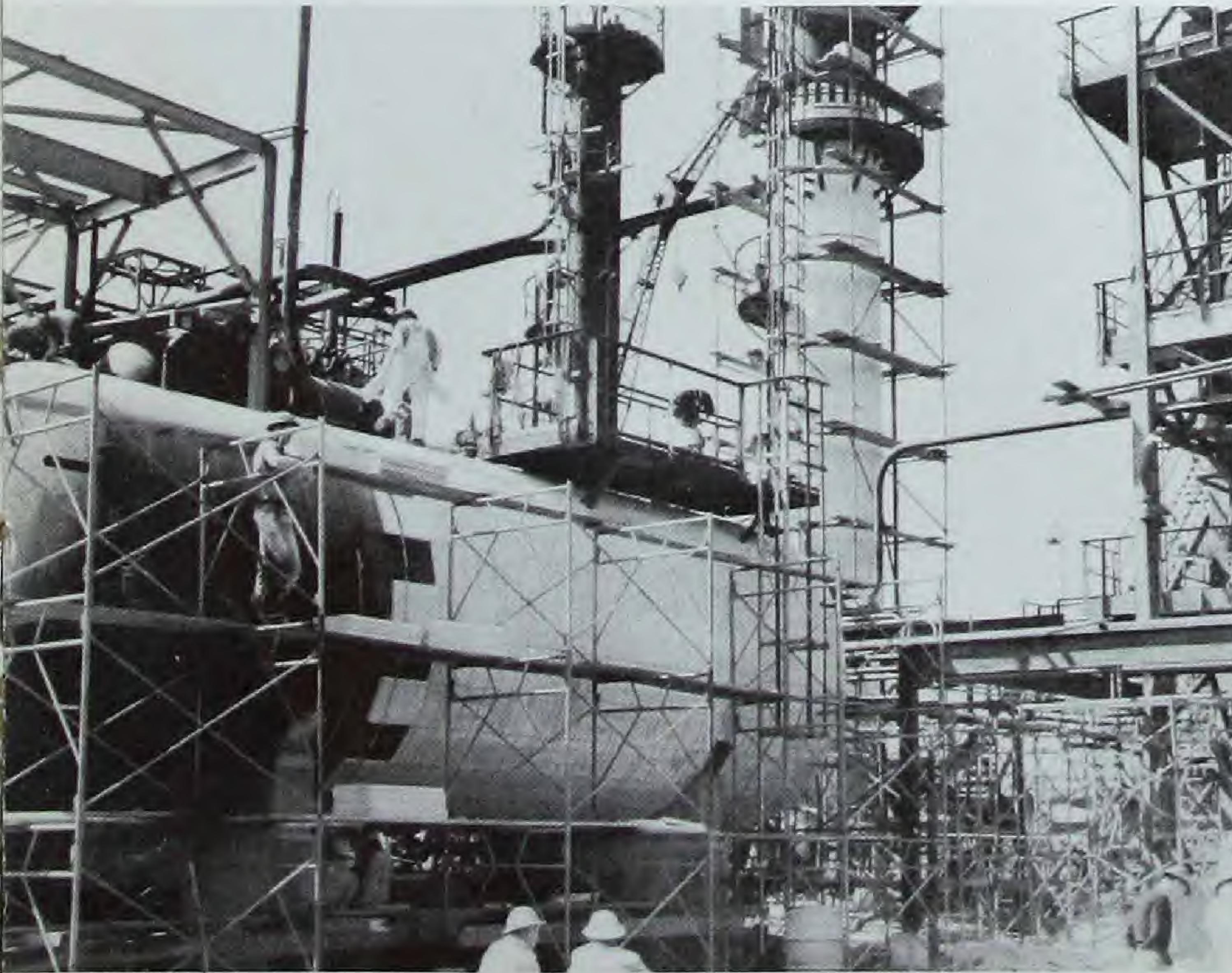
Hot Air Ducts

Turbines

Vessels



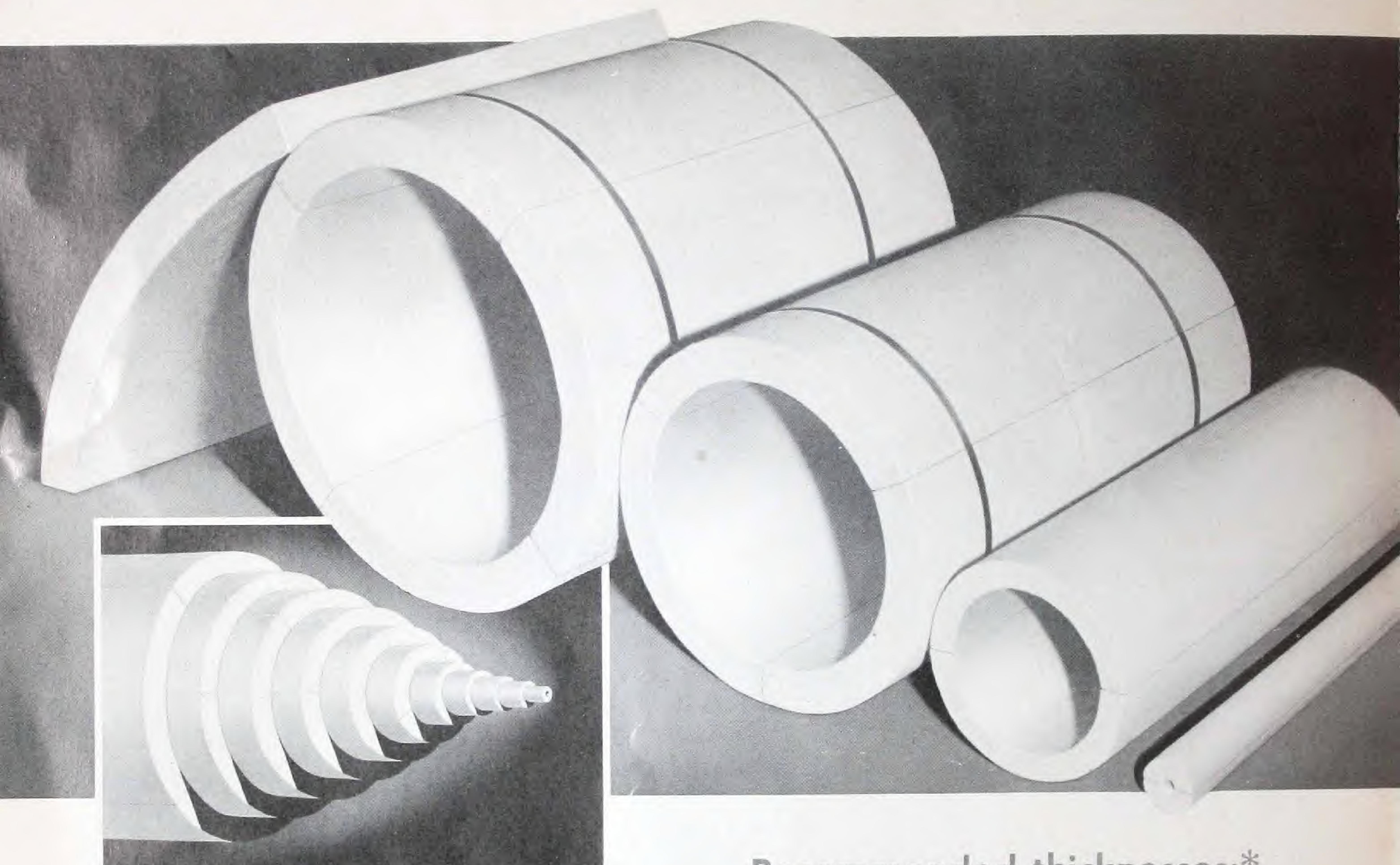
*Strength of material and large units mean
more economical application, less waste.*



*The smooth surfaces and straight edges of
the material help make a neat finished job.*

KAYLO

PIPE INSULATION



Kaylo Pipe Insulation reduces inventory requirements because of two features—its wide effective temperature range (up to 1200°F.) and its Simplified Dimensional Standards, which allow nesting.

Kaylo Pipe Insulation is produced in Simplified Dimensional Standards of thicknesses and diameters for pipe sizes from $\frac{1}{2}$ " to 72" and tubing down to $\frac{1}{4}$ " in diameter. O. D.'s of insulation correspond to O. D.'s of standard pipes, assuring proper fit for each pipe size and for nesting, when necessary. With this system of snug nesting, Kaylo Pipe Insulation fits all operating conditions, requires less items—reduces maintenance stock.

Recommended thicknesses:*

NOMINAL PIPE SIZE—IN.	TEMP. DIFFERENCE—HOT SURFACE TO AIR, DEG. F.											
	200	300	400	500	600	700	800	900	1000	1100	1200	
$\frac{1}{2}$	1	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	3	3	
$\frac{3}{4}$	1	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	3	3	
1	1	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	3	3	
$1\frac{1}{4}$	1	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	3	
$1\frac{1}{2}$	1	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	3	3	
2	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	3	3	
$2\frac{1}{2}$	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	3	3	$3\frac{1}{2}$	
3	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	$3\frac{1}{2}$	
$3\frac{1}{2}$	1	1	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	4	4	
4	1	1	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	4	4	
6	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	4	4	
8	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	$3\frac{1}{2}$	4	$4\frac{1}{2}$	
10	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	4	$4\frac{1}{2}$	
12	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	
14	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	
16	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	
18 to 72	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	

Unshaded = surface temp. under 140°F.
 Light Shaded = surface temp. 140°F. to 145°F.
 Heavy Shaded = surface temp. 145°F. to 150°F.

Standard sizes, thicknesses and forms:

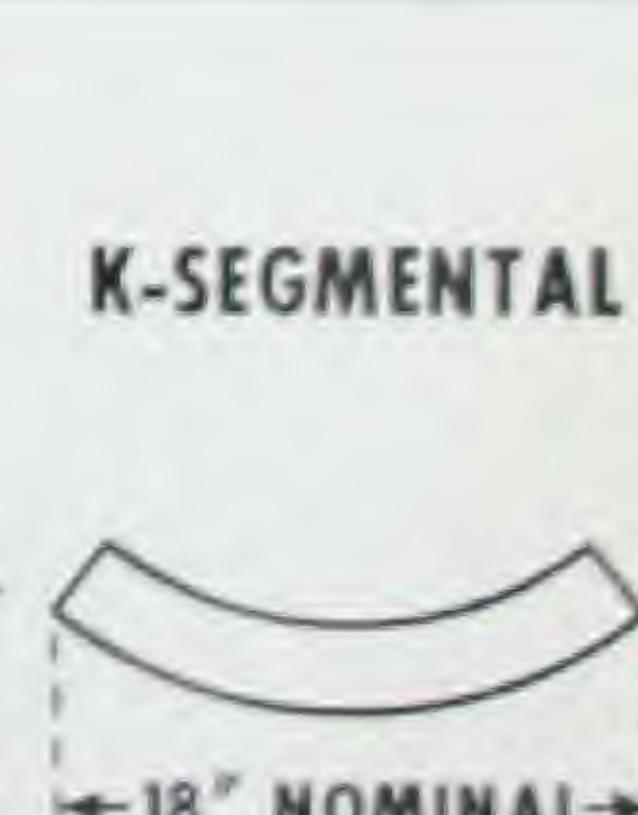
Red lines below show equal O.D.'s for conformance with Simplified Dimensional Standards.

NOMINAL PIPE SIZE	PIPE O. D.	NOMINAL THICKNESS OF INSULATION												FORMS	
		1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	SECTIONAL	TRI-SEGMENTAL	QUAD-SEGMENTAL		
1/2	.84	1.00	2.88	1.56	4.00	2.06	5.00	2.35	5.56	2.88	6.63				
3/4	1.05	.90	2.88	1.46	4.00	1.96	5.00	2.24	5.56	2.77	6.63				
1	1.32	1.08	3.50	1.58	4.50	2.11	5.56	2.64	6.63	3.14	7.63				
1 1/4	1.66	.90	3.50	1.40	4.50	1.94	5.56	2.47	6.63	2.97	7.63				
1 1/2	1.90	1.03	4.00	1.53	5.00	1.82	5.56	2.35	6.63	2.85	7.63				
2	2.38	1.03	4.50	1.56	5.56	2.09	6.63	2.59	7.63	3.09	8.63	3.59	9.63	4.16	10.75
2 1/2	2.88	1.03	5.00	1.31	5.56	1.84	6.63	2.34	7.63	2.84	8.63	3.34	9.63	3.91	10.75
3	3.50	1.00	5.56	1.53	6.63	2.03	7.63	2.53	8.63	3.03	9.63	3.59	10.75	4.09	11.75
3 1/2	4.00	.75	5.56	1.28	6.63	1.78	7.63	2.28	8.63	2.78	9.63	3.34	10.75	3.84	11.75
4	4.50	1.03	6.63	1.53	7.63	2.03	8.63	2.53	9.63	3.09	10.75	3.59	11.75	4.09	12.75
4 1/2	5.00	.78	6.63	1.28	7.63	1.78	8.63	2.28	9.63	2.84	10.75	3.34	11.75	3.84	12.75
5	5.56	1.00	7.63	1.50	8.63	2.00	9.63	2.56	10.75	3.06	11.75	3.56	12.75	4.19	14.00
6	6.63	.94	8.63	1.44	9.63	2.00	10.75	2.50	11.75	3.00	12.75	3.63	14.00	4.13	15.00
7	7.63			1.50	10.75	2.00	11.75	2.50	12.75	3.13	14.00	3.63	15.00	4.13	16.00
8	8.63			1.50	11.75	2.00	12.75	2.63	14.00	3.13	15.00	3.63	16.00	4.13	17.00
9	9.63			1.50	12.75	2.13	14.00	2.63	15.00	3.13	16.00	3.63	17.00	4.13	18.00
10	10.75			1.56	14.00	2.06	15.00	2.56	16.00	3.06	17.00	3.56	18.00	4.06	19.00
11	11.75			1.56	15.00	2.06	16.00	2.56	17.00	3.06	18.00	3.56	19.00	4.06	20.00
12	12.75			1.55	16.00	2.05	17.00	2.55	18.00	3.05	19.00	3.55	20.00	4.05	21.00
14	14.00			1.42	17.00	1.92	18.00	2.42	19.00	2.92	20.00	3.42	21.00	3.92	22.00
15	15.00			1.42	18.00	1.92	19.00	2.42	20.00	2.92	21.00	3.42	22.00	3.92	23.00
16	16.00			1.41	19.00	1.91	20.00	2.41	21.00	2.91	22.00	3.41	23.00	3.91	24.00
17	17.00			1.41	20.00	1.91	21.00	2.41	22.00	2.91	23.00	3.41	24.00	3.91	25.00
18	18.00			1.41	21.00	1.91	22.00	2.41	23.00	2.91	24.00	3.41	25.00	3.91	26.00
19	19.00			1.41	22.00	1.91	23.00	2.41	24.00	2.91	25.00	3.41	26.00	3.91	27.00
20	20.00			1.41	23.00	1.91	24.00	2.41	25.00	2.91	26.00	3.41	27.00	3.91	28.00
21	21.00			1.41	24.00	1.91	25.00	2.41	26.00	2.91	27.00	3.41	28.00	3.91	29.00
22	22.00			1.41	25.00	1.91	26.00	2.41	27.00	2.91	28.00	3.41	29.00	3.91	30.00
23	23.00			1.41	26.00	1.91	27.00	2.41	28.00	2.91	29.00	3.41	30.00	3.91	31.00
24	24.00			1.41	27.00	1.91	28.00	2.41	29.00	2.91	30.00	3.41	31.00	3.91	32.00
25	25.00			1.41	28.00	1.91	29.00	2.41	30.00	2.91	31.00	3.41	32.00	3.91	33.00
26	26.00			1.41	29.00	1.91	30.00	2.41	31.00	2.91	32.00	3.41	33.00	3.91	34.00
27	27.00			1.41	30.00	1.91	31.00	2.41	32.00	2.91	33.00	3.41	34.00	3.91	35.00
28	28.00			1.41	31.00	1.91	32.00	2.41	33.00	2.91	34.00	3.41	35.00	3.91	36.00
29	29.00			1.41	32.00	1.91	33.00	2.41	34.00	2.91	35.00	3.41	36.00	3.91	37.00
30	30.00			1.41	33.00	1.91	34.00	2.41	35.00	2.91	36.00	3.41	37.00	3.91	38.00
31	31.00			1.41	34.00	1.91	35.00	2.41	36.00	2.91	37.00	3.41	38.00	3.91	39.00
32	32.00			1.41	35.00	1.91	36.00	2.41	37.00	2.91	38.00	3.41	39.00	3.91	40.00
33	33.00			1.41	36.00	1.91	37.00	2.41	38.00	2.91	39.00	3.41	40.00	3.91	41.00
34	34.00			1.41	37.00	1.91	38.00	2.41	39.00	2.91	40.00	3.41	41.00	3.91	42.00
35	35.00			1.41	38.00	1.91	39.00	2.41	40.00	2.91	41.00	3.41	42.00	3.91	43.00
36	36.00			1.41	39.00	1.91	40.00	2.41	41.00	2.91	42.00	3.41	43.00	3.91	44.00
37	37.00			1.41	40.00	1.91	41.00	2.41	42.00	2.91	43.00	3.41	44.00		
38	38.00			1.41	41.00	1.91	42.00	2.41	43.00	2.91	44.00				
39	39.00			1.41	42.00	1.91	43.00	2.41	44.00						
40	40.00			1.41	43.00	1.91	44.00								
41	41.00			1.41	44.00										
42	42.00														
to															
72	72.00														

SINGLE LAYER ONLY

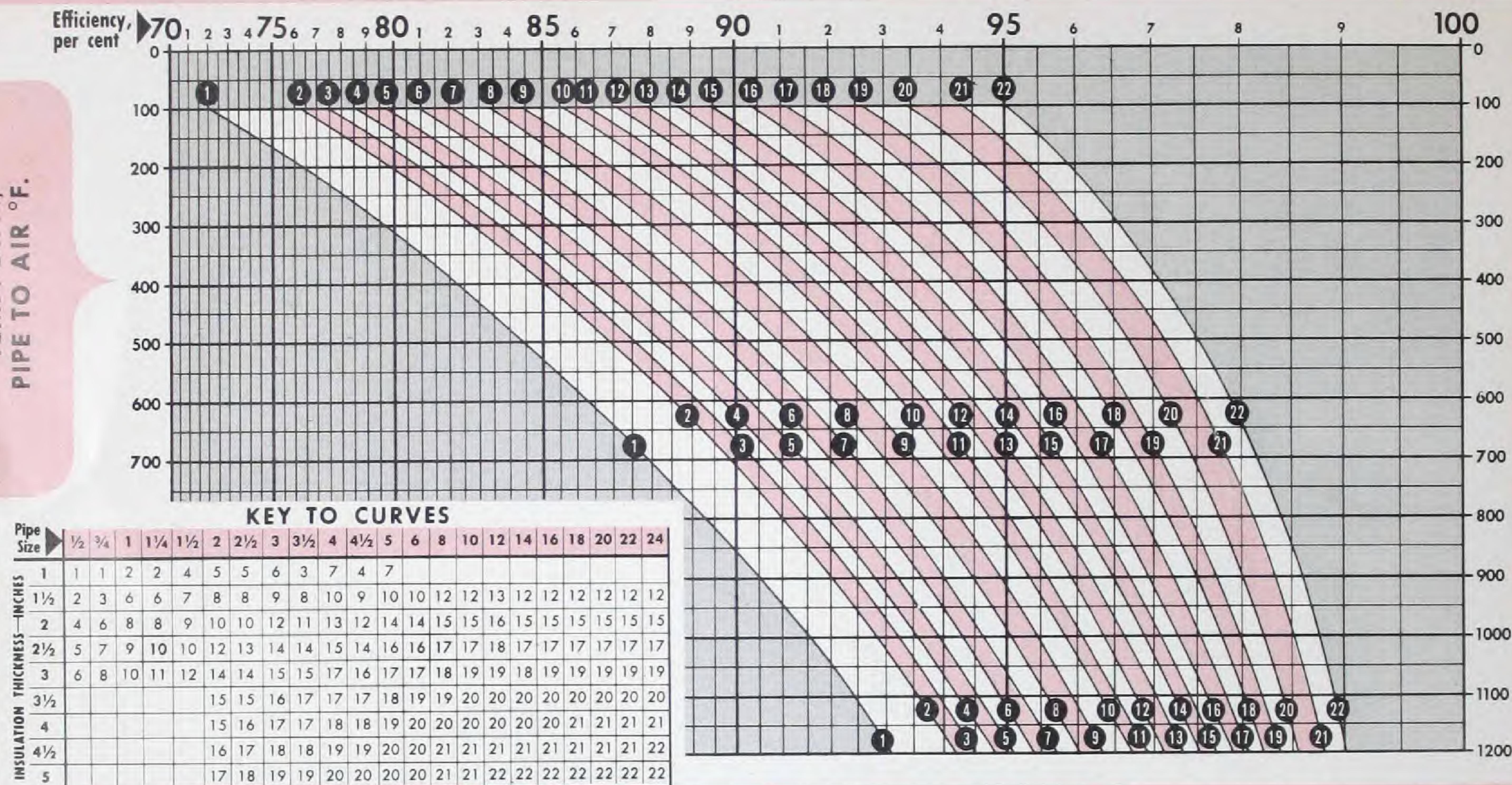
SINGLE OR DOUBLE LAYER

DOUBLE LAYER ONLY



KAYLO PIPE INSULATION

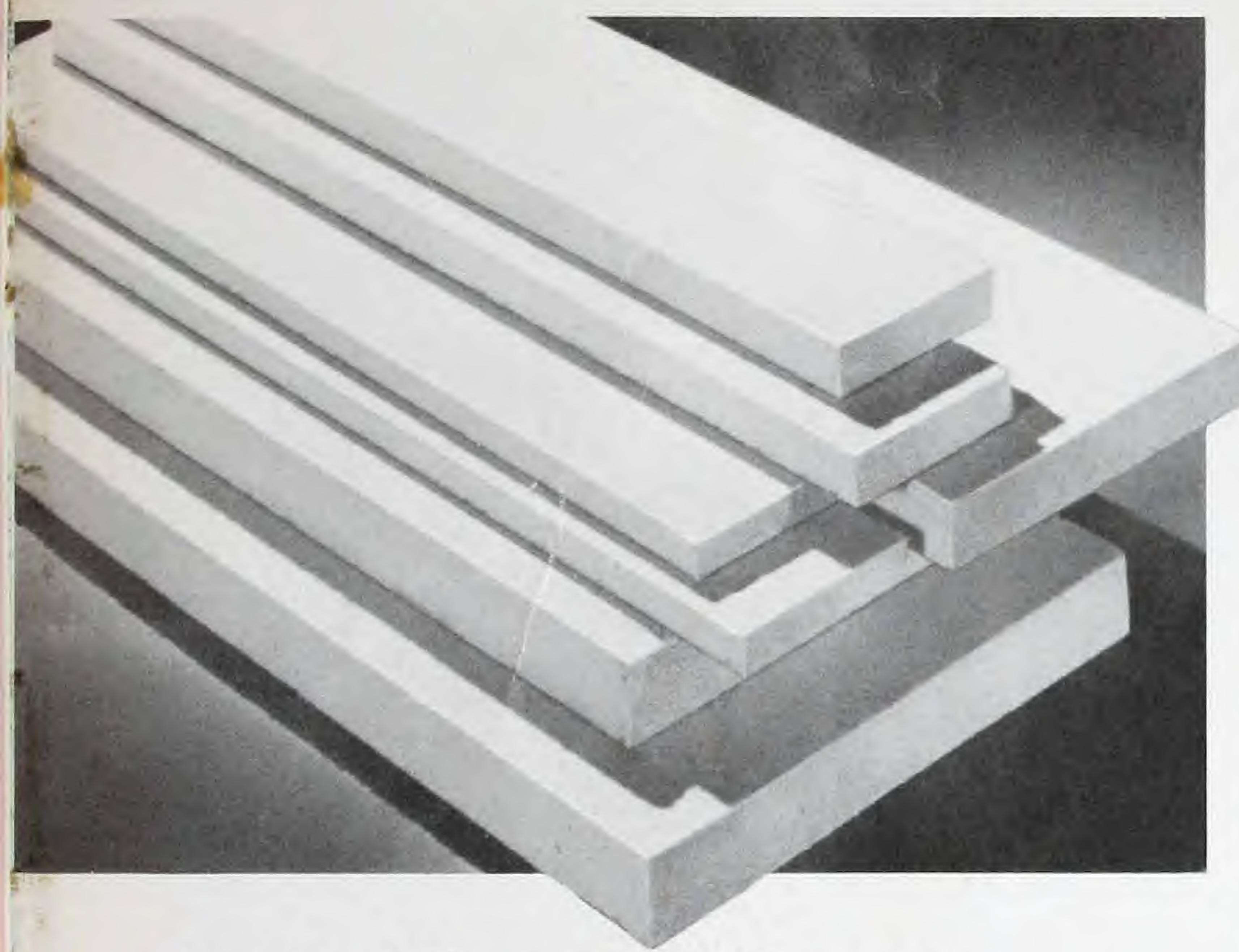
Insulation Efficiencies: Efficiency x Bare Pipe Heat Loss=Heat Saved By Insulation BTU/Lin.Ft./hr.
100-Efficiency x Bare Pipe Heat Loss=Heat Loss Through Insulation BTU/Lin.Ft./hr.



Bare Pipe Heat Loss: BTU per lineal foot, per hour. Still ambient air 80°F.

Nominal Pipe Size	Temperature diff., deg. F., pipe to air	100	200	300	400	500	600	700	800	900	1000	1100	1200
		1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5
	1/2	55	136	247	394	581	820	1120	1482	1929	2469	3115	3882
	3/4	67	167	304	483	716	1013	1381	1835	2391	3064	3869	4825
	1	82	206	373	595	884	1252	1709	2275	2967	3805	4809	6002
	1 1/4	102	255	464	741	1103	1565	2139	2851	3722	4778	6044	7547
	1 1/2	115	289	526	841	1252	1780	2434	3247	4242	5448	6894	8613
	2	141	355	647	1036	1546	2199	3013	4022	5260	6761	8562	10700
	2 1/2	168	423	773	1240	1853	2639	3619	4945	6330	8141	10317	12904
	3	202	502	930	1493	2234	3186	4373	5850	7663	9863	12507	15651
	3 1/2	228	575	1052	1691	2533	3616	4968	6649	8714	11222	14236	17822
	4	255	642	1176	1892	2836	4051	5570	7458	9780	12599	15988	20022
	4 1/2	281	708	1298	2090	3137	4481	6164	8258	10834	13962	17724	22201
	5	310	782	1435	2312	3472	4965	6834	9161	12022	15500	19680	24659
	6	364	920	1691	2728	4100	5870	8075	10848	14248	19763	23347	29267
	8	464	1178	2169	3506	5280	7570	10443	14024	18436	23801	30261	37955
	10	572	1447	2668	4318	6512	9350	12912	17355	22833	29500	37525	47089
	12	671	1699	3137	5086	7675	11031	15243	20505	26993	34891	44402	55742
	14	731	1851	3419	5544	8374	12042	16649	22403	29502	38143	48557	60967
	16	828	2098	3877	6294	9514	13692	18941	25499	33597	43451	55330	69493
	18	926	2348	4344	7059	10672	15374	21277	28660	37775	48873	62249	78204
	20	1022	2592	4797	7800	11806	17009	23554	31742	41848	54161	69003	86704
	22	1117	2835	5250	8539	12935	18642	25829	34817	45917	59439	75746	95196
	24	1213	3078	5706	9286	14071	20291	28122	37917	50023	64771	82564	103784

KAYLO[®] HEAT INSULATING BLOCK



Standard Sizes and Thicknesses:

(in inches)

Thicknesses*: 1, 1½, 2, 2½, 3, 3½, 4, 4½, 5

Widths: 3, 6, 9, 12, 18

Length: 36

*Thicknesses 3" and over are laminated.

Recommended Thicknesses:*

(in inches)

Temp. Diff.	TEMP. DIFF. HOT SURFACE TO AIR DEG. F.										
	200	300	400	500	600	700	800	900	1000	1100	1200
Thick- ness	1	1	1½	2	2½	3	3	3½	4	4½	5

*Unshaded. = Surface temp. under 140°F.

Heavy shaded = Surface temp. 145°F. to 150°F.

The complete range of standard widths up to 18" and thicknesses up to 5" allows Kaylo Heat Insulating Block to be used as single layer insulation for flat surfaces up to 1200°F., even in the temperature range which usually requires two thicknesses of dissimilar materials. This assumes that relatively high temperatures at joints are not objectionable for the higher working temperatures. Thus, single layers of Kaylo block can be used for nearly all the high temperature insulation applications for flat surfaces which occur in industry.

Kaylo heat insulation is also available in curved block, nominally 18" wide, to fit surfaces of large vessels from 6 to 60' in diameter. For vessels of greater diameter, flat block is used.

The complete range of Kaylo heat insulation, including both pipe insulation and block, can be comprehended by visualizing a huge solid mass of nested insulation, layer on layer, beginning with an inside diameter equivalent to the O.D. of a standard ¼" tube and increasing to infinity.

In this mass, built of successive, snug-fitting layers of Kaylo heat insulation, would be pipe insulation in Simplified Dimensional Standards for tubing or pipes from ¼ to 72" in diameter, curved block for vessels from 72" to 60' in diameter and flat block from 60' to infinity.

A Applying Kaylo Heat Insulating Block to locomotive boiler, using tie wires.

B Insulating ducts and boiler at power plant, using laced tie wires and wire mesh for finishing cement.

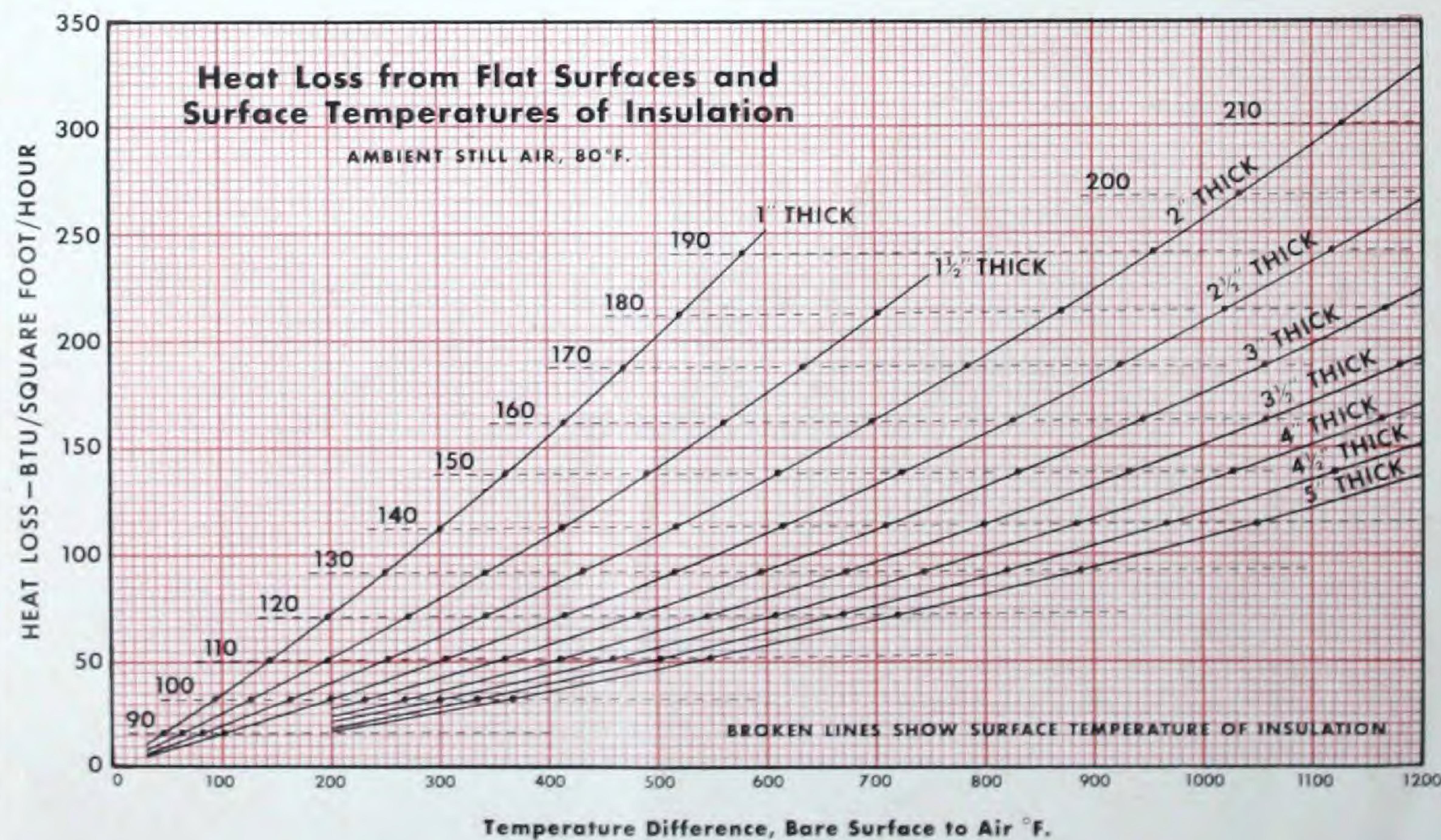
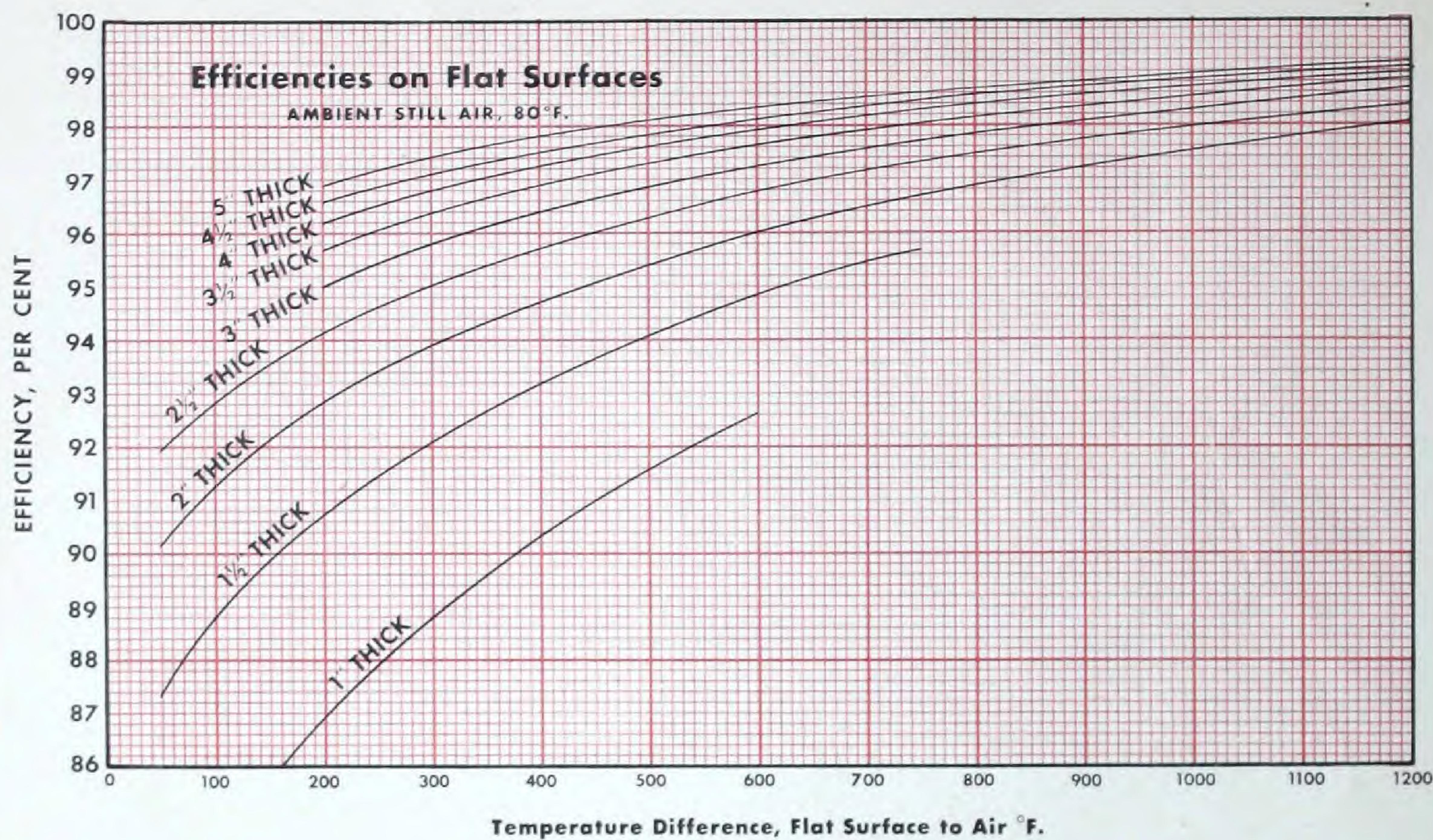
C Drying oven installation using studs and speed clips for fastening insulation.



KAYLO

HEAT INSULATING BLOCK

Heat Loss, Surface Temperatures, and Efficiencies



For Additional Information Write:

KAYLO DIVISION

Owens-Illinois Glass Company

TOLEDO 1, OHIO